[0908] Thus, in some embodiments, where it is determined that the temperature is changing, the duty cycle may likewise require an adjustment. Using one or more temperature sensors located either in a device/component and/or on a device/component, the temperature may be determined. In the exemplary embodiment, the temperature sensor or thermistor located in the volume sensor assembly **148** may be used to determine the temperature. However, in various other embodiments, one or more temperatures located in various locations in the apparatus/device/component and/or infusion pump system may be used. The temperature information may then be used to determine the nominal duty cycle for actuation and/or delivery of the pump volume.

[0909] As discussed above, the system and method rely on modeling and/or characterization of the device and/or apparatus in which the shape-memory alloy is being used. Thus, to determine the algorithm, a process or method as described above may be used. However, the algorithm may vary in various embodiments depending on many factors, including but not limited to: depending on the length and/or thickness and/or set up around the SMA wire as well as the geometry of the SMA wire, the anchoring technique used, and/or any coatings, air gaps, etc., around the SMA wire. Additionally, the result desired, i.e., depending on the function of the SMA wire, this may effect the algorithm determination.

[0910] Referring now also to FIG. **137**, a similar determination as shown in FIGS. **134-136** was performed on a valve, for example, in the exemplary embodiment, on the measurement valve assembly **610**. Thus, as is shown, the algorithm derived from the model shown in FIG. **137** differs from the earlier example. Thus, depending on the system in which the SMA wire is used, a model may be derived and an algorithm determined.

[0911] In some embodiments, rather than a temperature sensor, the system may use the time elapsed since the last actuation to determine a predicted temperature from a predictive model. Thus, a relationship may be established between the time since last actuation and the temperature of the SMA wire.

[0912] Thus, in various embodiments, a method for adjusting the control of SMA wire based on temperature or energy in the SMA wire is disclosed. In various embodiments of various systems, the amount of energy required for actuation of a given SMA wire in a given system and/or device and/or component may vary with temperature. Therefore, various embodiments include a method for determining the temperature or energy of an SMA wire and determining an ontime to accomplish an actuation based on the temperature and/or energy.

[0913] As the ontime is related to the amount of energy introduced to the system, in some embodiments, the total energy, i.e., the energy in the SMA wire pre-actuation and the energy added to the SMA wire, e.g., heat, equals the total energy. Thus, the method includes determining the total energy required to actuate e.g., a pump and/or valve and/or component and/or system, using an SMA wire, and determining the temperature and/or amount of energy in the SMA wire pre-actuation, then determining the amount of additional energy needed for actuation, then applying the energy needed. Some embodiments additionally include measuring the pump volume using a volume sensor assembly **148** and, if necessary, updating the total amount of energy required to actuate a pump to pump a volume of fluid.

[0914] Some embodiments include varying the ontime and/or the time energy is applied to an SMA wire to effectuate and/or actuate a pump to pump a target volume of fluid from a reservoir. Some embodiments additionally include measuring the volume of fluid pumped by pumping the volume of fluid into a volume sensor chamber and determining the volume of fluid using a volume measurement assembly. In some embodiments, the volume measured by the volume measurement assembly is used to determine the amount of energy needed to actuate and/or to cause a pump to pump a target volume of fluid from a reservoir.

[0915] Some embodiments include varying the ontime and/or the amount of time energy is applied to an SMA wire to effectuate and/or actuate a valve. In some embodiments, the valve may be downstream from a volume measurement assembly. In some embodiments, following actuation of the valve, the volume measurement assembly measures the volume of fluid in the volume sensor chamber and this volume is used to determine if the valve effectively opened to allow the fluid to flow out of the volume sensor chamber. In some embodiments, where it is determined that the volume did not flow out of the volume sensor chamber, it may be determined that the valve was not actuated. Following, the ontime used for actuation of the valve may be changed.

[0916] While the principles of the invention have been described herein, it is to be understood by those skilled in the art that this description is made only by way of example and not as a limitation as to the scope of the invention. Other embodiments are contemplated within the scope of the present invention in addition to the exemplary embodiments shown and described herein. Modifications and substitutions by one of ordinary skill in the art are considered to be within the scope of the present invention.

[0917] A number of embodiments have been described. Nevertheless, it will be understood that various modifications may be made. Accordingly, other embodiments are within the scope of the following claims.

1-20. (canceled)

21. A shape-memory alloy wire pumping system comprising:

at least one shape-memory alloy wire;

a pump plunger connected to the at least one shape-memory alloy wire wherein the shape-memory alloy wire, when actuated, actuates the pump plunger;

a valve member connected to the at least one shape-memory alloy wire wherein the shape-memory alloy wire, when actuated, actuates the valve member;

a controller for controlling an ontime of the at least one shape-memory alloy wire; and

a temperature sensor for determining the temperature of the shape-memory alloy wire wherein the controller determines the ontime based on the temperature of the shape-memory alloy wire.

22. The shape-memory alloy wire pumping system of claim **21**, wherein the temperature sensor is a thermistor.

23. The shape-memory alloy wire pumping system of claim **21**, wherein the temperature sensor is located adjacent to the shape-memory alloy wire.

24. The shape-memory alloy wire pumping system of claim **21**, wherein the controller determines the ontime based on the temperature of the shape-memory alloy wire before actuation of one of the pump plunger and the valve member.